

- Free-particle force:

$$\vec{F}_B = q(\vec{v} \times \vec{B})$$

$$F_B = qvB \sin \theta$$

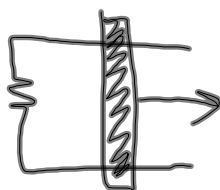
max @ 90° ; min @ 0°

- Current force:

$$\vec{F}_B = I(\vec{l} \times \vec{B})$$

$$F_B = IlB \sin \theta$$

- for circuits



- Magnetic field of a wire:



thumb in direction
of current
fingers curl in direction
of B-field

$$B = \frac{\mu_0}{2\pi} \frac{I}{r}$$

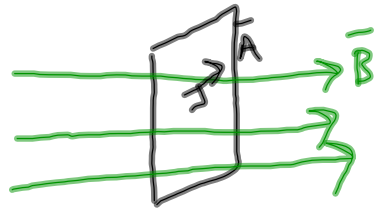
$$y = mx + b$$

$$B = \left(\frac{\mu_0 I}{2\pi} \right) \frac{1}{r}$$



- Magnetic flux:

$$\Phi_m = B A \cos \theta$$



\vec{A} is perpendicular to surface

- Creating electricity:

$$\mathcal{E}_{avg} = - \frac{\Delta \Phi_m}{\Delta t}$$

negative sign called Lenz's law,
which means that current is
induced in opposite direction

- Another way to create voltage:

$$\mathcal{E} = B l v$$